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REMARKS

This Amendment is responsive to the outstanding Office Action mailed October 14, 2004. A Petition For Extension Of Time is filed concurrently herewith in order to extend the time applicants have to respond for one (1) month, from January 14, 2004, to February 14, 2004.

Applicants have amended all of the claims to address the claims objections as set forth in pages 2-3 of the outstanding office action, and believes each of claims objected to are now in full compliance with 37 CFR 1.75(c).

35 USC § 102

Claims 1-14 were rejected under 35 USC § 102(b) in the outstanding office action as anticipated by US Patent No. 5,253,169 to Corby Jr. (Corby). With respect to claim 1, the sole independent claim, the Examiner asserts that Corby teaches a method comprising a phase of acquisition of a sequence of images, including an image of a present instant (t) in which the threadlike structure is to be extracted and an image of a past instant (t-1) in which the threadlike structure is detected as a string of points at col. 4, lines 31-36. To support same, the Examiner further asserts that Corby shows a detection screen at Fig. 1 (104) that captures frames of a threadlike structure, specifically the outline of a capacitor, representing multiple instances of time, that the digitizer and frame store (Fig. 1, 112) receives the frames and converts the images into a string of points.

The Examiner further asserts that Corby shows a phase of prediction of a silhouette of the threadlike structure estimated from said detected string of points, of the image of the past instant (col. 5, lines 1-8). To support same, the Examiner asserts that Corby teaches the phase of prediction is the peak finding algorithm (300), as shown in Fig. 3, and that the algorithm is part of a temporal sequence image analyzer (TSIA) (Fig. 1, 114), and that the peak finding algorithm (300) outputs a binary image showing the guide wire pixels, which correspond to a silhouette of a threadlike structure (col. 4, line 67 – col. 5, line 6). The Examiner further asserts that Corby also teaches a phase of pursuit for extracting a final string of points representing the threadlike structure in the image of the present instant t, including steps of estimation of constraints based on said silhouette for performing said extraction (col. 4, lines 27-8). To support same, the Examiner further asserts that the two-dimensional model creation module (Corby's 500 of Fig. 5), acts as a phase of pursuit and inputs the guide wire pixels from the phase of prediction (200), and outputs a 2-D guidewire model.

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Applicants respectfully disagree for at least the reasons set forth hereinafter.

Applicants claim 1, as amended hereby as to matters of formality of US practice, sets forth an image processing method for extracting a threadlike structure (GW) represented in an image. The method includes steps of executing a phase of acquisition of a sequence of images, including an image of a present instant (t) in which the threadlike structure is to be extracted and an image of a past instant (t-1) in which the threadlike structure is detected as a string of points (G_{t-1}), executing a phase of prediction of a silhouette (\hat{G}_t) of the threadlike structure estimated from said detected string of points (G_{t-1}) of the image of the past instant, executing a phase of pursuit for extracting a final string of points (G_t) representing the threadlike structure in the image of the present instant t, including estimating a constraint CZ_t , defined as a search zone, and θ , defined as the direction of said silhouette (\hat{G}_t). The constraints are utilized for performing said extraction

In contrast, Corby is intended to reduce x-ray dosage during fluoroscopic examinations by adaptively varying one or more system parameters (time between exposures, beam strength, beam extent and aim point) in a real time procedure based on identification of a guidewire and changes of its appearance. An estimate of the guidewires motion is formed, and based on the estimate, the x-ray beam is modulated so that the tip of the guidewire is in the image produced by the modulated x-ray beam at the time the next exposure occurs. Corby's intent is to significantly reduce the spatial extent of the x-ray beam, in real time, by predicting the motion of the catheter, and only exposing an area, corresponding to an estimated location and shape of the tips of the catheter at the time of the "next" exposure.

Corby does not include each of the elements of applicants' inventive methods, to wit, utilizing temporal information detected in at least one image of past sequence of images to calculate prediction data, the prediction data used for improving the guide-wire extraction in a subsequent image, i.e., "present" image. That is, the temporal information is acquired in a first or acquisition mode, and processed for detecting a "silhouette" of a threadlike structure from at least one image of the sequence acquired prior to the instant of the present. The "silhouette" is further processed in a second or pursuit mode to provide a restrained zone in which the threadlike structure is precisely and robustly extracted in the "present" image. Besides precision and robustness, the advantage of the method is that the processed image is provided in real time using information that is acquired in a time delay not necessarily compatible with real time.

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Accordingly, applicants respectfully request that the rejection of independent claim 1 (AS AMENDED) in view of Corby under Section 102(b) be withdrawn.

While claims 2-14 are also rejected under 102(b) in view Corby, applicant respectfully asserts that claims 2-14 are patentable for at least the reasons set forth in their argument for the patentability of claim 1, from which each of claims 2-14 depends, and respectfully request withdrawal of the same rejections of claims 2-14 under 102(b) in view of Corby.

Conclusion

It is clear from all of the foregoing that independent claim 1 is in condition for allowance. Dependent claims 2-14 depend from and further limit independent claim 1 and therefore are allowable as well.

The amendments herein are fully supported by the original specification and drawing, therefore, no new matter is introduced.

An early formal notice of allowance of claims 1-14 is requested.

Respectfully submitted,

By 

Steven Petersen, Reg. 31,287
for John F. Vodopia, Reg. 36,299
Attorney for Applicants
(914) 333-9627